

The opinion in support of the decision being entered today was *not* written for publication and is *not* binding precedent of the Board.

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte HELMUT BREHM
and HANS-GEORG HARTAN

Appeal 2006-2401
Application 10/069,721
Technology Center 1700

Decided: December 27, 2006

Before EDWARD C. KIMLIN, CHARLES F. WARREN, and
THOMAS A. WALTZ, *Administrative Patent Judges*.

WARREN, *Administrative Patent Judge*.

DECISION ON APPEAL

This is an appeal under 35 U.S.C. § 134 from the decision of the Examiner finally rejecting claims 1 through 7, 9 through 17, 19, and 20. Claim 18 is also of record and has been withdrawn from consideration by the Examiner under 37 C.F.R. § 1.142(b).

The Appeal was heard October 19, 2006.¹

Claims 1 through 4, 9 and 19 illustrate Appellants' invention of a water-soluble polymer composition obtained by continuous polymerization of at least one unsaturated monomer and a process of continuous polymerization, and are representative of the claims on appeal:

1. A water-soluble polymer composition obtained by continuous polymerization of at least one unsaturated monomer, wherein during said polymerization at least one parameter biasing the polymerization is varied according to a recurrent pattern.

2. The polymer composition according to claim 1, wherein the pattern is an oscillation about a mean value which can be selected at random.

3. The polymer composition according to claim 2, wherein the oscillation is harmonic or anharmonic.

4. The polymer composition according to claim 1, wherein at least one of the following parameters is subject to variation:

- a concentration of at least one monomer,
- an amount of a catalyst,
- an amount of a molecular weight modifier,
- a pH value of a monomer solution, or
- a composition of said monomer solution.

¹ Judge Franklin participated in the oral hearing but has become unavailable. Pursuant to 35 U.S.C. § 6(b) (2002), Judge Kimlin has been designated as a substitute to decide this appeal. *Cf. In re Bose Corp.*, 772 F.2d 866, 868-70, 227 USPQ 1, 2-4 (Fed. Cir. 1985) (reargument not required where Administrative Trademark Judge was substituted for another Administrative Trademark Judge who became unavailable after hearing in *ex parte* proceeding); see Manual of Patent Examining Procedure (MPEP) § 1202 (8th ed., Rev. 3, August 2005). An appeal, whether on brief or heard, is decided on the record. 37 C.F.R. §§ 41.37(c)(1)(vii) and 41.47(e)(2) (2006); see also MPEP §§ 1205.02 and 1209 (8th ed., Rev. 3, August 2005).

9. A process for the continuous polymerization of a water-soluble polymer composition, said process comprising

polymerizing at least one unsaturated monomer, wherein at least one parameter biasing said polymerization is varied according to a recurrent pattern.

The references relied on by the Examiner are:

Patel	US 6,103,839	Aug. 15, 2000
Hatsuda	US 6,174,978	Jan. 16, 2001
Brehm	US 6,911,499 B1	Jun. 28, 2005
Ramesh	EP 0 630 909 A1	Dec. 28, 1994
Davies	EP 0 296 331 B1	Feb. 22, 1995

The Examiner has advanced the following grounds of rejection on appeal:

claims 1 through 7, 19, and 20 under 35 U.S.C. § 102(b) as anticipated by or, in the alternative, under 35 U.S.C. § 103(a) as being obvious over Patel (Answer 3-4);

claims 1 through 7, 9 through 17, 19, and 20 under 35 U.S.C. § 102(b) as anticipated by or, in the alternative, under 35 U.S.C. § 103(a) as being obvious over Hatsuda, Ramesh or Davies (Answer 4-7);

claims 1 through 7, 9 through 17, 19, and 20 under the judicially created doctrine of obviousness-type double patenting as being unpatentable over patent claims 1 through 7 of Brehm (Answer 7).

Appellants substantively argue independent claim 1 with respect to the first ground of rejection, noting only the limitations of the remaining claims and alleging that the compositions of Patel are “different” from the so claimed compositions (Br., e.g., 4:5, 4-5, and 5-8; Reply Br., e.g., 9:12-14). With respect to the second ground of rejection, Appellants argue product-by-process claims 1 through 7, 15, 16, 19, and 20 as a group and process claims 9 through 14 as a group, substantively arguing independent claims 1, 9, and 19, noting only the limitations of the remaining claims and

alleging that the compositions and processes of each of the references are “different” from the so claimed compositions and processes (Br., e.g., 8:23-9:3, 10:2-4, and 10-16; Reply Br., e.g., 10:13-16 and 11:5-7). In this respect, 37 C.F.R. § 41.37(c)(1)(vii) (2005) states in pertinent part, “merely [pointing] out what a claim recites will not be considered an argument for separate patentability of the claim.” Appellants argue the appealed claims as a group with respect to the third ground of rejection (Br. 16-17; Reply Br. 12-13). The Examiner considered the sets of claims in this manner (Answer 4, 6-7, and 7-9). Thus, we decide this appeal based on claims 1 and 9 and on individual claims to the extent argued by Appellants. 37 C.F.R. § 41.37(c)(1)(vii) (2005).

We affirm the first stated rejection with respect to claims 1, 5 through 7, and 20 under § 102(b) and claims 1 through 7, 19, and 20 under § 103(a) over Patel; the second stated rejection of claims 1 through 4, 6, 7, 9 through 12, 16, 17, 19, and 20 under § 102(b) and claims 1 through 7, 9 through 17, 19, and 20 under § 103(a) over Ramesh; the second stated rejection under § 103(a) over each of Hatsuda and Davies; and the third stated rejection. We reverse the first stated rejection with respect to claims 2 through 4 and 19 under § 102(b); the second stated rejection of claims 5 and 13 through 15 under § 102(b) over Ramesh; and the second stated rejection under § 102(b) over each of Hatsuda and Davies.

Accordingly, we affirm the decision of the Examiner.

We refer to the Answer and to the Brief and Reply Brief for a complete exposition of the positions advanced by the Examiner and Appellants.

OPINION

The principal issues before us require that we interpret claims 1 and 9, and certain dependent claims necessary to that purpose, by giving the terms thereof the broadest reasonable interpretation in their ordinary usage in context as they would be understood by one of ordinary skill in the art, in light of the written description in the Specification unless another meaning is intended by Appellants as established therein, and without reading into the claim any disclosed limitation or particular embodiment. *See, e.g., In re Am. Acad. of Sci. Tech. Ctr.*, 367 F.3d 1359, 1364, 70 USPQ2d 1827, 1830 (Fed. Cir. 2004); *In re Hyatt*, 211 F.3d 1367, 1372, 54 USPQ2d 1664, 1666-67 (Fed. Cir. 2000); *In re Morris*, 127 F.3d 1048, 1054-55, 44 USPQ2d 1023, 1027 (Fed. Cir. 1997); *In re Zletz*, 893 F.2d 319, 321-22, 13 USPQ2d 1320, 1322 (Fed. Cir. 1989).

Claim 9 defines a continuous polymerization process for producing a water-soluble polymer, and claim 1 defines a water-soluble polymer product in product-by-process format encompassing the same continuous polymerization process. *See, e.g., In re Spada*, 911 F.2d 705, 708-09, 15 USPQ2d 1655, 1657-58 (Fed. Cir. 1990); *In re Thorpe*, 777 F.2d 695, 697, 227 USPQ 964, 966 (Fed. Cir. 1985); *In re Wertheim*, 541 F.2d 257, 271, 191 USPQ 90, 103-04 (CCPA 1976). The process specified in each claim comprises at least any manner of continuous polymerization of at least any unsaturated monomer using any manner of apparatus which provides a polymer composition that is water soluble to any extent. Thus, the continuous process can be conducted by introducing in any manner the unsaturated monomer and any other reactants and reagents, separately or in

admixture, on any apparatus providing a moving support. The moving support apparatus can include any conveying or polymerization belt and any extruder, the attendant processing advantages and disadvantages of the apparatus notwithstanding. *See* claims 4, 5, 12, 13, and 19; Specification, e.g., 2:28-3:10 and 3:20-32; *see generally*, Patel col. 1, l. 19, to col. 4, l. 11, col. 6, ll. 33-37, and col. 7, l. 19, to col. 8, l. 3.

There is no dispute that variations in such parameters as reactants and reagents, reaction conditions, and apparatus affect, that is, bias, the polymerization reactions occurring during the continuous process, thus resulting in different mixtures of different polymers and/or copolymers having different chemical and/or physical properties (*see* Reply Br. 1-8). The variations can result from a step of controlling a biasing parameter to any possible extent. This can include varying reactants and/or reagents at the beginning of the continuous process, e.g., introduced at the beginning of a moving support apparatus; the introduction of the same or different amounts of reactants and reagents at different points or zones along the moving support apparatus; and regulation of temperature or other conditions at different points or zones of the apparatus.

The variations can also result from uncontrolled conditions which affect biasing parameters, such as slightly varying amounts of reactants and reagents introduced on or in the apparatus by a meter set at a particular amount; non-uniform mixing of solutions of reactants and reagents before introduction to the apparatus; and the non-uniform mixing of reactants and reagents during residency caused by the apparatus. *Id.* There is no claim limitation which requires that the controlled biasing parameter has a greater

affect on the resulting polymer composition than the uncontrolled conditions.

The processes encompassed by claim 9 involve at least one step varying at least one parameter biasing a continuous polymerization to obtain a water-soluble polymer composition. The water-soluble polymer compositions products encompassed by claim 1 are the result of at least one controlled variation step *and* any and all uncontrolled variations in a parameter or parameters biasing a continuous polymerization process.

The language of both claims involved in the issues on appeal is concerned with at least one controlled variation and is represented by that of claim 1: “wherein during said polymerization at least one parameter biasing said polymerization is varied according to a recurrent pattern.” In this respect, Appellants set forth in the written description in the Specification that

[i]n the meaning of the invention, “according to a recurrent pattern” means that the parameters biasing the polymerization are varied in any desired manner, but at regularly recurring time intervals within a reasonable range familiar to those skilled in the art, and preferably in a continuous fashion.

The pattern preferably is an oscillation about a mean value selectable at random. Said oscillation preferably is harmonic or anharmonic and preferably undamped.

The parameters preferably are varied prior to starting the polymerization, e.g., in the feed of the preferably aqueous monomer solution to the moving support

Specification 4:4-15.

The “preferably” conditions in this disclosure are optional and thus, not within the specific disclosed “meaning” of the subject language of claim

1. This includes the phrase “preferably in a continuous fashion.” Indeed, we find no basis in the claims or the Specification on which to read these preferences into claims 1 and 9 as a limitation or limitations on the process. The preferences with respect to “an oscillation” further limit the subject matter encompassed by claims 1 and 9 to the extent that they are specified in dependent claims 2, 3, 16, 10, and 11, and the first “oscillation” preference is included in independent claim 19. There is no claim specifying “in a continuous fashion.” For completeness, we note that claim 20, dependent on claim 1, further specifies that any biasing parameter “is varied at regular recurring time intervals.”

We interpret the phrase “‘according to a recurrent pattern’ means that the parameters biasing the polymerization are varied in any desired manner, but at regularly recurring time intervals within a reasonable range familiar to those skilled in the art” (Specification 4:4-8), to include varying in any manner and extent any biasing parameter at any regularly recurring interval, e.g., of residency time passing through a zone, over the residency of the reaction medium on or in any moving support apparatus. For example, the phrase includes any controlled difference in temperature from one zone to the next in a moving support apparatus, and any difference in the amount of reagents and/or reactants introduced in the zones. In these examples, there is a “pattern” of varying a biasing parameter in “recurrent” manner in “regularly occurring time intervals” as the reaction medium is conveyed through the zones during residency time in the apparatus. Indeed, we are of the opinion that one skilled in the art would recognize from the context of the claims and the written description in the Specification, that the term

“pattern” is used by Appellants in its customary meaning of “[a] plan, diagram, or model to be followed in making things.”²

Contrary to Appellants’ position (e.g., Reply Br. 2), there is no limitation with respect to the manner and extent to which the parameter is “varied” in claims 1 and 9. Claims 2, 10, and 19 specify that the parameter is varied as “an oscillation about a mean value which can be selected at random.” There is no limitation on the “oscillation,” and thus, can be of any amplitude and frequency which need not be consistent. In other words, all that is required is that the parameter must oscillate, that is, alternatively swing on opposite sides of any mean value to any extent.³ Indeed, we find no basis in the claims or the written description in the Specification on which to read into claims 1, 2, 9, 10, and 19 “a sine-shaped oscillation” (Specification 9:9-11 and 9-10) or other symmetrical variation (Specification, e.g., Example 1) as a limitation as Appellants argue (e.g., Reply Br. 2-8). In this respect, there is no basis in the claims or the Specification on which to read symmetrical block copolymers in symmetrical compositions into claims 1, 2, 9, 10, and 19 as a limitation or limitations on the claimed processes and products as Appellants argue (e.g., Reply Br. 2-8). Indeed, as we discussed above, the processes encompassed by the appealed claims can include uncontrolled variations in a parameter or parameters biasing a continuous polymerization process.

² See, e.g., **pattern**, *The American Heritage Dictionary Of The English Language* 1290 (4th ed., Boston, Houghton Mifflin Company. 2000).

³ See, e.g., **oscillate**, *The American Heritage Dictionary Of The English Language* 1243-44.

Finally, we determine that one skilled in the art would consider the claim term “water-soluble polymer composition” to have its ordinary meaning in light of the Specification and the prior art as including polymers that swell in water, that is, absorb water, or dissolve in water at normal temperatures to any extent. *See, e.g.*, Specification (e.g., 1:1-8; 2:1-2; 10:10:31-11:10; Ramesh (e.g., 24:35-56; 2:9-18 and 29-36; 5:55-6:9); Hatsuda (e.g. col. 3, ll. 51-60, and col. 10, ll. 11-22); **polymer, water-soluble**, *Hawley’s Condensed Chemical Dictionary* 898-99 (14th ed., Richard J. Lewis, Sr., revisor, New York, John Wiley & Sons, Inc. 2001).

Turning now to the rejection of claim 1 over Patel under § 102(b),⁴ we find that Patel provides evidence that prima facie describes each and every element of the claimed invention, arranged as required by the claim, as we interpreted it above, either expressly or under the principles of inherency, in a manner sufficient to have placed a person of ordinary skill in the art in possession thereof. *See, e.g., Spada*, 911 F.2d at 708, 15 USPQ2d at 1657. Indeed, Patel Example 2 describes a process for producing a water-soluble anionic copolymer composition by continuous copolymerization of the unsaturated monomers acrylamide and acrylic acid in an extruder, wherein the reactor temperature, a parameter that biases the polymerization, is varied by increasing it in successive zones of the apparatus (Patel, e.g., col. 11, ll. 1-6). The regulation of temperature in this manner as the reaction medium is conveyed through the zones during residency time in the

⁴ The alternative grounds of rejection under §§ 102(b) and 103(a) require separate consideration. *See, e.g., In re Spada*, 911 F.2d 705, 707 n.3, 15 USPQ2d 1655, 1657 n.3 (Fed. Cir. 1990).

apparatus constitutes “a recurrent pattern” of varying temperature in “regularly occurring time intervals within a reasonable range familiar to those skilled in the art.”

Thus, prima facie, the water-soluble polymer compositions produced by the process of Patel Example 2 reasonably appear to be identical to the claimed water-soluble anionic copolymer compositions falling within appealed claim 1 and within dependent claims 5 through 7, and 20, therefore reasonably describing the claimed products encompassed by these claims within the meaning of § 102(b).

We further find that prima facie the claimed products of claims 1, 5 through 7, and 20 would have been obvious under § 103(a) on the same basis because it is well settled that “anticipation is the ultimate of obviousness.” *See In re Baxter Travenol Labs.*, 952 F.2d 388, 392, 21 USPQ2d 1281, 1284-85 (Fed Cir. 1991) (citing *In re Fracalossi*, 681 F.2d 792, 794, 215 USPQ 569, 571 (CCPA 1982)).

Further with respect to the ground of rejection under § 103(a) over Patel, we find that the reference additionally would have disclosed to one of ordinary skill in this art that the continuous polymerization of one or more unsaturated monomers and other reactants and reagents to obtain water-soluble homo- and co-polymer compositions of varying charge and molecular weight range distribution is further affected by varying the monomer solution and other solutions. These variations include controlling the concentration of the unsaturated monomer(s) and/or other reagents and reactants in the solutions; the temperature of the solution(s) at the time of addition; the point(s) of addition of the solution(s) to the extruder; the

manner of mixing the solution(s) in the extruder; and residency time in the extruder through control of feed rate and screw speed (Patel, e.g., col. 1, ll. 8-16; col. 2, ll. 6-10, 22-26, 32-37, and 46-53; col. 3, l. 45, to col. 4, l. 7; col. 4, ll. 13-21; col. 5, ll. 39-65; col. 6, ll. 29-30, and 43-63; col. 7, ll. 13-17 and 43-65; col. 8, ll. 6-16 and 20-29; and Patel Examples 1 and 2). We find that this person would have appreciated from these teachings that while all of these biasing parameters can be intentionally varied, precise control over all of these, including mixing action, is not easily achieved and different compositions would be obtained at the same parameter settings (*see above* pp. 6-7).

Patel does not limit the nature of the variation in any of these parameters, thus leaving the manner in which the continuous polymerization is conducted to obtain water-soluble polymer compositions having desired properties, including charge and molecular weight range distribution, to one of ordinary skill in this art. Patel teaches that different products are obtained when the monomer(s) are mixed with polymerization initiators and other reactants and reagents in different amounts, with the solution(s) added at the extruder inlet, or different solutions of different amounts of the monomer(s) and/or initiators and/or other reagents and reactants are added separately at the inlet and/or via ports in different extruder zones (Patel, e.g., col. 3, l. 66, to col. 4, l. 3, col. 4, l. 44-47, col. 5, ll. 39-45 and 58-65, col. 6, ll. 29-30 and 43-63, col. 7, ll. 43-47, and Examples 1 and 2).

We determine from the evidence in Patel that one of ordinary skill in this art would have added the monomer(s), initiators and other reactants and reagents to the reactor in any “variations” or “patterns,” as these and similar

terms are used in the Specification and claims (*see above* pp. 7-9), that would result in the desired water-soluble polymer compositions. Indeed, the manner of the addition of the ingredients to the extruder clearly biases the continuous polymerization to that end. This person, through pre-planning or monitoring the course of the polymerization, can add a greater amount or a lesser amount of the different solutions at the inlet and through different ports over residence time to obtain the desired products. Such variations in addition of ingredients from the expected course of in-line addition at the inlet can reasonably be considered “an oscillation” which can further be “harmonic or anharmonic” and “undamped,” as these and similar terms are used in the Specification and claims (*see above* pp. 7-9).

On the basis of this evidence, we determine that, *prima facie*, one of ordinary skill in this art routinely following the teachings of Patel would have reasonably arrived at water-soluble polymer compositions that are identical or substantially identical products to the claimed water-soluble polymer compositions encompassed by appealed product-by-process claim 1 and in dependent claims 2 through 7, 19, and 20. This is particularly the case since the processes specified in the claims and those disclosed by Patel reasonably appear to be identical or substantially identical. Therefore, the claimed products are obvious from the products of Patel within the meaning of § 103(a).

Accordingly, the burden with respect to the grounds of rejection of the appealed claims under §§ 102(b) and 103(a) over Patel as discussed above, has shifted to Appellants to submit effective argument and/or objective evidence to patentably distinguish the claimed water-soluble

polymer compositions over this reference. See *In re Spada*, 911 F.2d 705, 708-09, 15 USPQ2d 1655, 1657-58 (Fed. Cir. 1990) (“The Board held that the compositions claimed by Spada ‘appear to be identical’ to those described by Smith. While Spada criticizes the usage of the word ‘appear’, we think that it was reasonable for the PTO to infer that the polymerization by both Smith and Spada of identical monomers, employing the same or similar polymerization techniques, would produce polymers having the identical composition.”); *In re Best*, 562 F.2d 1252, 1254-56, 195 USPQ 430, 432-34 (CCPA 1977) (“Where, as here, the claimed and prior art products are identical or substantially identical, or are produced by identical or substantially identical processes, the PTO can require an applicant to prove that the prior art products do not necessarily or inherently possess the characteristics of his claimed product. See *In re Ludtke*, [441 F.2d 660, 169 USPQ 563 (CCPA 1971)]. Whether the rejection is based on “inherency” under 35 U.S.C. § 102, on “prima facie obviousness” under 35 U.S.C. § 103, jointly or alternatively, the burden of proof is the same, and its fairness is evidenced by the PTO’s inability to manufacture products or to obtain and compare prior art products.” (footnote and citation omitted)); *In re Skoner*, 517 F.2d 947, 950-51, 186 USPQ 80, 82-83 (CCPA 1975) (“Appellants have chosen to describe their invention in terms of certain physical characteristics Merely choosing to describe their invention in this manner does not render patentable their method which is clearly obvious in view of [the reference].” (citation omitted)). To the extent that the polymer compositions disclosed by Patel anticipate the

claimed products encompassed by claims 1, 5 through 7, and 20, the case of obviousness is irrebuttable. *Fracalossi*, 681 F.2d at 794, 215 USPQ at 571.

We agree with Appellants (Br. 3-8; Reply Br. 8-10) that Patel does not describe the disclosed processes and products disclosed therein in the terms employed in the rejected claims and the Specification to indicate varying biasing parameters following “a recurrent pattern” (*see above* pp. 7-9). However, we find that the teachings in Patel to vary the amount and input of biasing parameters such as ingredients and temperature control result in processes identical or substantially identical to those specified in the claims and thus in the identical and substantially identical products. *See Skoner*, 517 F.2d at 950-51, 186 USPQ at 82-83.

We fail to find any evidence to the contrary in the “comparative data” provided in the tables at pages 20-21 of the Specification relied on by Appellants to establish that the products of specification Examples 2 and 3 are “superior over the polymer compositions of the prior art” (Reply Br. 7-8). There is little information disclosed with respect to the compared Praestol® products, none of which involves the processes by which these commercial products were prepared. Thus, there is no evidence that the commercial products fairly represent the products and the processes of making the same disclosed by Patel. *See e.g., Baxter Travenol Labs., supra* (“[W]hen unexpected results are used as evidence of nonobviousness, the results must be shown to be unexpected compared with the closest prior art. [Citation omitted.]”); *In re Burckel*, 592 F.2d 1175, 1179-80, 201 USPQ 67, 71 (CCPA 1979) (the claimed subject matter must be compared with the closest prior art in a manner which addresses the thrust of the rejection);

In re Blondel, 499 F.2d 1311, 1317, 182 USPQ 294, 298 (CCPA 1974) (the indirect evidence provided a reliable indication of the performance of the closest claimed and prior art compounds); *In re Dunn*, 349 F.2d 433, 439, 146 USPQ 479, 483 (CCPA 1965) (“[W]e do not feel it an unreasonable burden on appellants to require comparative examples relied on for non-obviousness to be truly comparative. The cause and effect sought to be proven is lost here in the welter of unfixed variables.”); *see also In re Heyna*, 360 F.2d 222, 228, 149 USPQ 692, 697 (CCPA 1966) (citing *Dunn*, 349 F.2d at 439, 146 USPQ at 483).

In the absence of an explanation by Appellants of the practical significance of the reported results, it is not apparent on this record that the evidence is sufficient to support a contention that such results are indeed unexpected in view of the teachings of Patel. *See, e.g., In re Geisler*, 116 F.3d 1465, 1470, 43 USPQ2d 1362, 1365-66 (Fed. Cir. 1997); *In re Merck & Co, Inc.*, 800 F.2d 1091, 1099, 231 USPQ 375, 381 (Fed. Cir. 1986); *In re Longi*, 759 F.2d 887, 897, 225 USPQ 645, 651-52 (Fed. Cir. 1985); *In re Klosak*, 455 F.2d 1077, 1080, 173 USPQ 14, 16 (CCPA 1972); *In re Lindner*, 457 F.2d 506, 508, 173 USPQ 356, 358 (CCPA 1972); *In re D’Ancicco*, 439 F.2d 1244, 1248, 169 USPQ 303, 306 (1971).

Accordingly, based on our consideration of the totality of the record before us, we have weighed the evidence of anticipation and obviousness found in Patel with Appellants’ countervailing evidence of and argument for non-anticipation and nonobviousness, and conclude that the claimed invention encompassed by appealed claims 1, 5 through 7 and 20 would have been anticipated as a matter of fact under 35 U.S.C. § 102(b) and that

the claimed invention encompassed by appealed claims 1 through 7, 19 and 20 would have been obvious as a matter of law under 35 U.S.C. § 103(a).

We find no evidence in Patel describing the claimed water-soluble polymer compositions falling within claims 2 through 4 and 19 within the meaning of 35 U.S.C. § 102(b), and accordingly, we reverse this ground of rejection as to these claims.

Considering now the grounds of rejection over Ramesh, we find that this reference would have disclosed to one of ordinary skill in this art continuous polymerization of one or more unsaturated monomers and other reactants and reagents to obtain water-soluble polymer compositions of different physical properties that are affected by varying the input of the monomer solution. Ramesh discloses that a portion of the monomer solution, with and without other ingredients, is added initially and the remainder, which can have different ingredients including monomers, is added incrementally in any amounts at substantially consistent addition rates in any desired time frame following initiation of the process. Thus, the reaction mixture contains sufficient monomer and/or growing polymer chains to continuously maintain the polymerization reaction from initiation to termination. Ramesh, e.g., Abstract; 2:8-18; 5:3-12 and 33-54; 5:55-6:9; 6:19-37; 7:31-53; 7:54-8:24; 9:27-43; 11:21-31; 12:5-55; 13:32-14:11; and Examples 1-7) The variation in the monomer solutions and manner of addition bias the polymerization process and thus the water-soluble polymer composition. Indeed, Ramesh discloses, for example, that “[a]s the degree of variation as to mole ratios and/or monomer species increases, the degree of heterogeneousness of the polymer produced increases, particularly when

the post-initiation monomer feed is commenced at a time later than immediately after polymerization initiation” (Ramesh 8:19-22).

With respect to the rejection of claims 1 and 9 under § 102(b) over Ramesh, we find that the reference *prima facie* describes embodiments meeting each and every element of the claimed invention, arranged as required by the claim, as we interpreted it above, either expressly or under the principles of inherency, in a manner sufficient to have placed a person of ordinary skill in the art in possession thereof. *See, e.g., Spada*, 911 F.2d at 708, 15 USPQ2d at 1657. Each of Ramesh Examples 1-7 describes a continuous polymerization process producing water-soluble cationic co- or ter-polymer compositions by polymerization of at least one unsaturated monomer in a reactor equipped with a stirrer, wherein the monomer solution, a parameter that biases the polymerization, is varied by adding it to the reactor in an initial portion with the remainder added at a substantially consistent addition rate subsequent to initiation of polymerization (Ramesh, *e.g.*, 14:22-27 and 53-58, 15:30-35, 16:10-13 and 29-31, 18:40-42, and 19:55-57). The regulation of addition of monomers and other reactants and reagents in this manner during residency time in the reactor constitutes “a recurrent pattern” of varying the concentration of monomer and other reactants and reagents in “regularly occurring time intervals within a reasonable range familiar to those skilled in the art.” Furthermore, the substantially consistent addition reasonably appears to involve oscillations about a mean amount, which oscillations are anharmonic and undamped. For example, one skilled in this art would have reasonably inferred from the disclosure “substantially consistent addition rate (which was about 1.4 ml

per minute)” in Ramesh Example 2 that each addition can be more or less than 1.4 ml per minute, thus oscillating about the 1.4 ml value in an anharmonic, undamped manner.

Thus, prima facie, the continuous polymerization processes and the water-soluble polymer compositions disclosed by Ramesh reasonably appear to be identical to the claimed polymer compositions and polymerization processes falling within claims 1 and 9, and within dependent claims 2 through 4, 6, 7, 10 through 12, 16, 17, 19, and 20, therefore reasonably describing the claimed products and processes encompassed by these claims within the meaning of § 102(b).

We further find that prima facie the claimed processes and products of claims 1 through 4, 6, 7, 9 through 12, 16, 17, 19, and 20 would have been obvious under § 103(a) on the same basis because it is well settled that “anticipation is the ultimate of obviousness.” *See Baxter Travenol Labs.*, 952 F.2d at 392, 21 USPQ2d at 1284-85 (citing *Fracalossi*, 681 F.2d at 794, 215 USPQ at 571).

Further with respect to the ground of rejection under § 103(a), we find that the evidence in Ramesh prima facie would have disclosed to one of ordinary skill in this art armed with the knowledge in the art, that other monomers and reagents than those employed in the Examples can be used in the disclosed polymerization processes to produce the corresponding water-soluble polymer compositions, and that the content and manner of addition of the monomer solutions can be varied to obtain the desired product. Ramesh does not teach effecting the continuous polymerization on a moving support as required by dependent claims 5 and 13. However, the reference

does not specify that the continuous polymerization process taught therein must be conducted in the reactor used in the Examples thereof (Ramesh, e.g., 5), and Appellants acknowledge that it was known in the art to conduct continuous polymerization processes on moving supports (Specification, e.g., 2:28-3:10). Ramesh further does not teach that the water-soluble polymer composition is processed to obtain a powdered form as required by dependent claims 14 and 15. However, Ramesh acknowledges, as does Appellants, that it was known in the art to obtain a dry powdered product (Ramesh, e.g., 2:37-40; Specification, e.g., 2:28-3:10). The fact that Ramesh describes dry powder products as requiring additional processing in manufacturing and use would not have led one of ordinary skill away from providing the product in this form. *See, e.g., In re Gurley*, 27 F.3d 551, 553, 31 USPQ2d 1130, 1132 (Fed. Cir. 1994) (“We share Gurley’s view that a person seeking to improve the art of flexible circuit boards, on learning from Yamaguchi that epoxy was inferior to polyester-imide resins, might well be led to search beyond epoxy for improved products. However, Yamaguchi also teaches that epoxy is usable and has been used for Gurley’s purpose.”).

Thus, on the basis of the evidence in the reference, we determine that, *prima facie*, one of ordinary skill in this art routinely following the teachings of Ramesh would have arrived at continuous polymerization processes and the water-soluble polymer compositions produced by the processes that reasonably appear to be identical or substantially identical products to the claimed processes and polymer compositions encompassed by appealed product-by-process claim 1 through 7, 9 through 17, 19, and 20,

particularly since the processes specified in the claims and those disclosed by Ramesh reasonably appear to be identical or substantially identical. Therefore, the claimed products are obvious from the products of Ramesh within the meaning of § 103(a).

Accordingly, the burden with respect to the grounds of rejection of the appealed claims under §§ 102(b) and 103(a) over Ramesh as discussed above, has shifted to Appellants to submit effective argument and/or objective evidence to patentably distinguish the claimed water-soluble polymer compositions over this reference. *See Spada*, 911 F.2d at 708-09, 15 USPQ2d at 1657-58; *Best*, 562 F.2d at 1254-56, 195 USPQ at 432-34; *Skoner*, 517 F.2d at 950-51, 186 USPQ at 82-83. To the extent that the polymerization process and the polymer compositions disclosed by Ramesh anticipate the claimed processes and products encompassed by claims 1 through 4, 6, 7, 9 through 12, 16, 17, 19, and 20, the case of obviousness is irrebuttable. *Fracalossi*, 681 F.2d at 794, 215 USPQ at 571.

We cannot agree with Appellants (Br. 9-10; Reply Br. 10-11) that merely feeding monomer in increments does not result in varying this biasing parameter in “a recurrent pattern” (*see above* pp. 7-9). Indeed, variation in the addition of the monomer(s) and other reagents and reactants in the continuous polymerization process is taught by the reference to result in different concentrations of these ingredients and thus in different polymer compositions (*see above* pp. 17-18).

Appellants’ arguments with respect to Ramesh do not refer to the evidence in the Specification that we discussed above (*see above* pp. 15-16).

In any event, such evidence is no more pertinent to Ramesh than it is to Patel.

Accordingly, based on our consideration of the totality of the record before us, we have weighed the evidence of anticipation and obviousness found in Ramesh with Appellants' countervailing evidence of and argument for non-anticipation and nonobviousness, and conclude that the claimed invention encompassed by appealed claims 1 through 4, 6, 7, 9 through 12, 16, 17, 19, and 20 would have been anticipated as a matter of fact under 35 U.S.C. § 102(b) and that the claimed invention encompassed by appealed claims 1 through 7, 9 through 12, 19, and 20 would have been obvious as a matter of law under 35 U.S.C. § 103(a).

We find no evidence in Ramesh describing the claimed water-soluble polymer compositions falling within claims 5 and 13 through 15 within the meaning of 35 U.S.C. § 102(b), and accordingly, we reverse this ground of rejection as to these claims.

Considering now the second stated ground of rejection under § 103(a) over Hatsuda and over Davies, we find that each of these references would have disclosed to one of ordinary skill in the art a continuous polymerization process to prepare water-soluble polymer compositions in the form of a dry powder. The polymerization is conducted by supplying a solution of at least one monomer and other reactants and reagents to a reactor or on a moving belt, wherein the temperature of the reaction medium is permitted to rise to a maximum temperature and maintained at that temperature for the remaining residence time. Hatsuda, e.g., col. 2, ll. 41-48; col. 3, l. 2, to col. 5, l. 2; col. 5, ll. 10-31; col. 7, ll. 50-67; col. 8,

ll. 6-20; and Examples 1-7; Davies, e.g., 3:1-10 and 36-57; 4:15-27; 4:46-5:17; and Example 4.

We do not find in either Hatsuda or Davies as a matter of fact any express teaching to vary a parameter biasing the continuous polymerization reaction in a recurrent pattern as specified in claims 1 and 9. We also do not find in each of these references any evidence establishing that as a matter of fact any such variations in a recurrent pattern are necessarily inherent in any of the illustrative embodiments. Indeed, the fact that the reaction temperature is permitted to rise in an uncontrolled manner to a maximum temperature which is then maintained does not amount to varying the temperature in a recurrent pattern as claimed. Thus, in the absence of an embodiment expressly or inherently describing the claimed products and process encompassed by the appealed claims as we have interpreted them above within the meaning of 35 U.S.C. § 102(b), we reverse the grounds of rejection of the appealed claims under this statutory provision over Hatsuda or Davies. *See, e.g., Schering Corp. v. Geneva Pharms.*, 339 F.3d 1373, 1377, 67 USPQ2d 1664, 1667 (Fed. Cir. 2003); *In re Cruciferous Sprout Litig.*, 301 F.3d 1343, 1349, 64 USPQ2d 1202, 1206 (Fed. Cir. 2002); *Mehl/Biophile Int'l Corp. v. Milgram*, 192 F.3d 1362, 1365, 52 USPQ2d 1303, 1305 (Fed. Cir. 1999); *Spada*, 911 F.2d at 708-09, 15 USPQ2d at 1657-58.

We do, however, find that each of the references disclose that variations in the temperature, residency time, monomers and other reactants and reagents bias the process and affect the properties of the polymers in the polymer compositions (Hatsuda, e.g., col. 3, ll. 3-60, and col. 10, ll. 2-10;

Davies, e.g., 4:46-5:5:8, and 7:44-48). We determine that one of ordinary skill in this art would have been motivated to vary the properties of the water-soluble polymers in the compositions and thus would have varied one of more of the biasing parameters. We interpreted the appealed claims to specify that any variation(s) in a biasing parameter occur in a recurrent pattern to any extent. With respect to the processes encompassed by claim 9 and claims dependent thereon, we determine that prima facie one of ordinary skill in this art routinely following the teachings of each of Hatsuda and Davies would have arrived at continuous polymerization processes which are identical or substantially identical to processes encompassed by these claims. With respect to the products encompassed by claim 1, the claimed dependent thereon, and claim 19, we determine that prima facie this person routinely following the teachings of each of Hatsuda and Davies would have arrived at water-soluble polymer compositions which are identical or substantially identical to water-soluble compositions encompassed by these claims. We point out that the processes disclosed in these references include uncontrolled variations such as in the temperature of the reaction medium and the mixing of the ingredients in the apparatus. *See, e.g., B.F. Goodrich Co. v. Aircraft Braking Sys. Corp.*, 72 F.3d 1577, 1582, 37 USPQ2d 1314, 1318 (Fed. Cir. 1996) (“When obviousness is based on a particular prior art reference, there must be a showing of a suggestion or motivation to modify the teachings of that reference. This suggestion or motivation need not be expressly stated.” (citation omitted)).

Accordingly, the burden with respect to the grounds of rejection of the appealed claims under § 103(a) over each of Hatsuda and Davies as

discussed above, has shifted to Appellants to submit effective argument and/or objective evidence to patentably distinguish the claimed water-soluble polymer compositions over these references. *See Spada*, 911 F.2d at 708-09, 15 USPQ2d at 1657-58; *Best*, 562 F.2d at 1254-56, 195 USPQ at 432-34; *Skoner*, 517 F.2d at 950-51, 186 USPQ at 82-83.

We agree with Appellants (Br. 9; Reply Br. 10-11) that Hatsuda does not specifically address the temperature variation in the polymerization process by varying the same according to a recurrent pattern as specified in the appealed claims. We further agree with Appellants (Br. 10; Reply Br. 11-12) that it is their Specification and not Davies which contains disclosure discussed by the Examiner (Answer 5-6). However, the second ground of rejection is also based on § 103(a) and Appellants have not argued that each of the references would not have rendered the claimed inventions encompassed by the appealed claims obvious to one of ordinary skill in the art. Appellants' arguments with respect to each of Hatsuda and Davies do not refer to the evidence in the Specification that we discussed above (*see above* pp. 15-16), and in the same manner, the evidence does not pertain to Hatsuda or Davies..

Accordingly, based on our consideration of the totality of the record before us, we have weighed the evidence of obviousness found in each of Hatsuda and Davies with Appellants' countervailing evidence of and argument for nonobviousness, and conclude that the claimed invention encompassed by appealed claims 1 through 7, 9 through 12, 19, and 20 would have been obvious as a matter of law under 35 U.S.C. § 103(a).

We now consider the ground of rejection of the appealed claims under the judicially created doctrine of obviousness-type double patenting as being unpatentable over patent claims 1 through 7 of Brehm. Appellants argue that the claims of Brehm “are directed [sic] polymer compositions which absorb aqueous fluids” thus differing from the claimed “polymers that are water-soluble” (Br. 16; emphasis supplied). Appellants contend that the polymers of Brehm, particularly of claims 1 and 7, “are powdered and cross-linked which makes them useful as polymers which absorb aqueous fluids” (Br. 16; reply Br. 12-13). The Examiner submits that “the extent of crosslink present” determines the extent of water-solubility and finds that the polymers of Brehm are “not limited to be water-insoluble, thus maintaining the position that the appealed claims encompass the polymers of Brehm” (Answer 7 and 9).

There is no dispute that the patent claims encompass a process for continuous polymerization of at least one unsaturated monomer by varying the at least one biasing parameter according to a recurrent process, in the same manner as the processes specified in the appealed claims. The appealed claims specify that the product is a water-soluble polymer composition with the sole limitation that the same is made with at least some amount of at least one unsaturated monomer which can be any unsaturated monomer. Indeed, other monomers, reactants and reagents, including crosslinking agents, can be employed to prepare the water-soluble polymer compositions since the same are not precluded by any limitation in the appealed claims. We determined the term “water-soluble polymer composition” in the appealed claims included polymers that swell in water,

that is, absorb water at normal temperatures to any extent (*see above* p. 10). The claimed polymer compositions can be powdered (*see* appealed claims 14 and 15).

The plain language of patent claims 1 and 7 of Brehm requires that the polymer compositions prepared by the claimed process are powdered, crosslinked, and absorb aqueous fluids to the extent permitted by the limitations specifying the weight percent ranges of certain monomers employed and a range of 0.01-5.0 wt.-% of one or more cross-linking agents. In interpreting the patent claim language in light of the patent specification, we note that Brehm describes the polymers as “hydrophilic, swellable polymer compositions for aqueous fluids” and acknowledges that it was well-known in the art that the amount of “solubles” in the product is affected by crosslinker concentration (col. 1, l. 63, to col. 2, l. 6).

On this record, we find no distinction other than the scope of the encompassed processes and products between the appealed and patent claims based on the properties of the polymer compositions produced by the processes encompassed by the patent claims to absorb water. Such polymer compositions fall within the polymer compositions termed “water-soluble” in the appealed claims, and the claimed and patented processes encompass the same monomers, reagents and other reactants.

Thus, it is clear that, as found by the Examiner, the appealed process claims encompass the processes of the patent claims and the appealed product claims encompass the products produced by the processes of the patent claims. *See In re Goodman*, 11 F.3d 1046, 1052-53, 29 USPQ2d 2010, 2015-16 (Fed. Cir. 1993); *In re Vogel*, 422 F.2d 438, 441-43,

164 USPQ 619, 621-23 (CCPA 1970); *In re Bridgeford*, 357 F.2d 679, 680-83, 149 USPQ 55, 56-58 (CCPA 1966).

Accordingly, we affirm the ground of rejection of all of the appealed claims under the judicially created doctrine of obviousness-type double patenting.

The Examiner's decision is affirmed.

OTHER ISSUES

In view of our affirming the decision of the Examiner with respect to all of the appealed claims, we decline to exercise our authority under 37 C.F.R. § 41.50(b) (2006) and enter new grounds of rejection of appealed claims 9 and 13 through 15 under 35 U.S.C. § 102(b) over Patel and of appealed claims 9 through 17 under 35 U.S.C. § 103(a) over Patel on the same basis we affirmed the grounds of rejection under these statutory provisions over this reference (*see above* pp. 10-17).

Instead, we leave it to the Examiner to enter these grounds of rejection upon any further prosecution of the appealed claims subsequent to the disposition of this appeal.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(iv) (2005).

AFFIRMED

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